WHAT IS CLAIMED IS:

1   1.   A method for constructing a query system for use with a body of data, comprising

2   operations of:

3   providing a data schema describing entries in a body of data such that the entries

4   provide instances of the data schema;

5   providing multiple appearance templates each providing instructions for computer

6   presentation of on-screen constructs to receive user input of query

7   parameters;

8   providing multiple subquery generators each comprising machine-executable code

9   to prepare machine-executable query instructions applying a predetermined

10   logical operation to the body of data;

11   providing multiple control schemas each control schema prescribing constituent

12   components of query form controls providing instances of that control

13   schema, the prescribed components of each control schema comprising:

14   specification of at least one appearance template and at least one subquery

15   generator;

16   mapping between the specified appearance template and the data schema

17   and between the specified subquery generator and the data schema;

18   providing one or more query form schemas prescribing constituent components of

19   corresponding query form annotations that provide instances of the query

20   form schemas, said components comprising:

21   identification of one or more of instances of the control schemas;

22   identification of elements of the data schema to be presented in query

23   results.

1   2.   The method of claim 1, wherein the control schemas are separate from the query

2   form schemas.

1   3.   The method of claim 1, further comprising operations of developing the query

2   system, comprising:

3   constructing one or more controls, each control comprising an instance of one of the

4   control schemas;

5   constructing one or more query form annotations, each annotation comprising an

6   instance of one of the query form schemas.

1   4.   The method of claim 3, wherein the control schemas are integrated into the query

2   form schemas, and the operations of constructing the query form annotations includes the

3   operation of constructing the controls.

1   5.   The method of claim 3, further comprising operations of compiling the query form

2   annotations, comprising for each query form annotation:

3   constructing a query form web page including the appearance templates specified

4   by the controls identified by said query form annotation;

5   in association with the constructed query form web page, initializing the subquery

6   generators specified by the controls identified by said query form annotation.

1   6.   The method of claim 5, further comprising run-time operations, comprising:

2   responsive to user request submitted via web browser, outputting one of the query

3   form web pages to the web browser;

4   receiving query parameters submitted by the web browser in completion of the query

5   form web page;

6   executing the subquery generators initialized in association with the query form web

7   page to prepare machine-readable query instructions according to the query

8   parameters;

9   executing the query instructions upon the body of data and receiving an output of

10   query results responsive to execution of the query request;

11   transmitting web browser compatible presentation code representing the query

12   results to the web browser.

1   7.   The method of claim 5, further comprising operations of reconfiguring the query

2   system after the compiling operations comprising:

3   revising contents of at least one of the following:

4   one or more of the controls;

5   one or more of the query form annotations;

6   one or more subquery generators;

7   one or more appearance templates;

8   performing recompilation operations for target query form annotations including at

9   least each revised query form annotation, and each query form annotation

10   having revised subcomponents;

11   said recompilation operations comprising, for each target query form annotation,

12   constructing a query form web page including the appearance templates

13   specified by the controls identified by the target query form annotation, and

14   initializing the subquery generators specified by the controls identified by the

15   target query form annotation.

1   8.   The method of claim 6, where:

2   the run-time operations further comprise, before the transmitting operation,

3   preparing rendering instructions for transforming the query results into web

4   browser compatible presentation code representative of the query results;

5   the transmitting operation further comprise executing the rendering instructions to

6   prepare the presentation code.

1   9.   The method of claim 6, where the transmitting operation comprises transmitting

2   presentations code presenting the query results in the query form web page being output to

3   the web browser.

1   10.   A method of developing a query structure that includes a data schema describing

2   entries in a body of data such that the entries provide instances of the data schema;

3   multiple appearance templates each providing instructions for computer presentation of on-

4   screen constructs to receive user input of query parameters; multiple subquery generators

5   each comprising machine-executable code to prepare machine-executable query

6   instructions applying a predetermined logical operation to the body of data; multiple control

7   schemas each control schema prescribing constituent components of a different query

8   form control, the components of each control schema including specification of at least one

9   appearance template and at least one subquery generator and mapping between the

10   specified appearance template and the data schema and between the specified subquery

11   and the data schema; one or more query form schemas prescribing constituent

12   components of corresponding query form annotations said components including

13   designation of one or more controls and designation of elements of the data schema to be

14   presented in query results; the method of developing the query structure comprising

15   operations of:

16   constructing one or more controls, each control comprising an instance of the

17   control schema;

18   constructing one or more query form annotations, each annotation comprising an

19   instance of the query form schema.

11.   A process of constructing a query system for use with a body of data, comprising

2   operations of:

3   providing a data schema describing entries in a body of data such that the entries

4   provide instances of the data schema;

5   providing multiple appearance templates each providing instructions for computer

6   presentation of on-screen constructs to receive user input of query

7   parameters;

8   providing multiple subquery generators each comprising machine-executable code

9   to prepare machine-executable query instructions applying a predetermined

10   logical operation to the body of data;

11   providing one or more query form schemas prescribing constituent components of

12   corresponding query form annotations that provide instances of the query

13   form schemas, said components comprising:

14   specification of at least one appearance template and at least one subquery

15   generator;

16   mapping between the specified appearance template and the data schema

17   and between the subquery generator and the data schema;

18   identification of elements of the data schema to be presented in query

19   results.

1   12.   The method of claim 11, further comprising operations of developing the query

2   system, comprising:

3   constructing one or more query form annotations, each annotation comprising an

4   instance of one of the query form schemas.

1   13.   The method of claim 12, further comprising operations of compiling the query form

2   annotations, comprising for each query form annotation:

3   constructing a query form web page including the appearance templates specified

4   by the query form annotation;

5   in association with the constructed query form web page, initializing the subquery

6   generators specified by the query form annotation.

1   14.   The method of claim 13, further comprising run-time operations, comprising:

2   responsive to user request submitted via web browser, outputting one of the query

3   form web pages to the web browser;

4   receiving query parameters submitted by the web browser in completion of the query

5   form web page;

6   executing the subquery generators initialized in association with the query form web

7   page to prepare machine-readable query instructions according to the query

8   parameters;

9   executing the query instructions upon the body of data and receiving an output of

10   query results responsive to execution of the query request;

11   transmitting web browser compatible presentation code representing the query

12   results to the web browser.

1   15.   The method of claim 13, further comprising operations of reconfiguring the query

2   system after the compiling operations, comprising:

3   revising contents of at least one of the following:

4   one or more of the query form annotations;

5   one or more subquery generators;

6   one or more appearance templates;

7   performing recompilation operations for target query form annotations including at

8   least each revised query form annotation, and each query form annotation

9   having revised subcomponents;

10   said recompilation operations comprising, for each target query form annotation,

11   constructing a query form web page including the appearance templates

12   specified by the target query form annotation, and initializing the subquery

13   generators specified by the target query form annotation.

1   16.   The method of claim 14, where:

2   the run-time operations further comprise, before the transmitting operation,

3   preparing rendering instructions for transforming the query results into web

4   browser compatible presentation code representative of the query results;

5   the transmitting operation further comprises executing the rendering instructions to

6   prepare the presentation code.

1   17.   The method of claim 14, where the transmitting operation comprises transmitting

2   presentation code presenting the query results in the query form web page being output to

3   the web browser.

1   18.   A method of developing a query structure that includes a data schema describing

2   entries in a body of data such that the entries provide instances of the data schema;

3   multiple appearance templates each providing instructions for computer presentation of on-

4   screen constructs to receive user input of query parameters; multiple subquery generators

5   each comprising machine-executable code to prepare machine-executable query

6   instructions applying a predetermined logical operation to the body of data; one or more

7   query form schemas prescribing constituent components of corresponding query form

8   annotations said components including (1) specification of at least one appearance

9   template and (2) specifications of at least one subquery generator and (3) mapping

10   between the specified appearance template and the data schema and between the

11   subquery generator and the data schema and (4) designation of elements of the data

12   schema to be presented in query results, the method of developing the query structure

13   comprising operations of:

14   constructing one or more query form annotations, each annotation comprising an

15   instance of the query form schema.

1   19.   A signal-bearing medium tangibly embodying a program of machine-readable

2   instructions executable by a digital processing apparatus to perform operations for

3   providing a query system for use with a body of data, said operations comprising:

4   providing a data schema describing entries in a body of data such that the entries

5   provide instances of the data schema;

6   providing multiple appearance templates each providing instructions for computer

7   presentation of on-screen constructs to receive user input of query

8   parameters;

9   providing multiple subquery generators each comprising machine-executable code

10   to prepare machine-executable query instructions applying a predetermined

11   logical operation to the body of data;

12   providing multiple control schemas each control schema prescribing constituent

13   components of query form controls providing instances of that control

14   schema, the prescribed components of each control schema comprising:

15   specification of at least one appearance template and at least one subquery

16   generator;

17   mapping between the specified appearance template and subquery generator

18   and the data schema;

19   providing one or more query form schemas prescribing constituent components of

20   corresponding query form annotations that provide instances of the query

21   form schemas, said components comprising:

22   identification of one or more of instances of the control schema;

23   identification of elements of the data schema to be presented in query

24   results.

1   20.   A signal-bearing medium tangibly embodying a program of machine-readable

2   instructions executable by a digital processing apparatus to perform operations for

3   providing a query system for use with a body of data, said operations comprising:

4   providing a data schema describing entries in a body of data such that the entries

5   provide instances of the data-schema;

6   providing multiple appearance templates each providing instructions for computer

7   presentation of on-screen constructs to receive user input of query

8   parameters;

9   providing multiple subquery generators each comprising machine-executable code

10   to prepare machine-executable query instructions applying a predetermined

11   logical operation to the body of data;

12   providing one or more query form schemas prescribing constituent components of

13   corresponding query form annotations that provide instances of the query

14   form schemas, said components comprising:

15   specification of at least one appearance template and at least one subquery

16   generator;

17   mapping between the specified appearance template and subquery generator

18   and the data schema;

19   identification of elements of the data schema to be presented in query

20   results.

1   21.   A query processing platform, comprising:

2   multiple control schemas, and multiple query form controls each comprising an

3   instance of one of the control schemas;

4   one or more query form schemas and multiple query form annotations each

5   comprising an instances of one of the query form schemas;

6   a data schema;

7   appearance templates;

8   a compiler including access to the controls, annotations, and appearance templates;

9   a run-time engine including a query rendering engine and a query assembler;

10   subquery generators accessible by the assembler and the compiler.

1   22.   A query processing system, comprising:

2   a data schema describing entries in a body of data such that the entries provide

3   instances of the data schema;

4   multiple appearance templates each providing instructions for computer

5   presentation of on-screen constructs to receive user input of query

6   parameters;

7   multiple subquery generators each comprising machine-executable code to prepare

8   machine-executable query instructions applying a predetermined logical

9   operation to the body of data;

10   multiple control schemas each control schema prescribing constituent components

11   of query form controls providing instances of that control schema, the

12   prescribed components of each control schema comprising:

13   specification of at least one appearance template and at least one subquery

14   generator;

15   mapping between the specified appearance template and the data schema

16   and between the specified subquery generator and the data schema;

17   a query form schema prescribing constituent components of query form annotations

18   that provide instances of the query form schema, said components

19   comprising:

20   identification of one or more of instances of the control schema;

21   identification of elements of the data schema to be presented in query

22   results.

23.   The system of 22, further comprising:

       one or more controls, each control comprising an instance of the control schema;

       one or more query form annotations, each annotation comprising an instance of the

               query form schema.

24.   The system of claim 22, further comprising a compiler programmed to perform

operations to process query form annotations, the operations comprising, for each query

form annotation:

       constructing a query form web page including the appearance templates specified

               by the controls identified by said query form annotation;

       in association with the constructed query form web page, initializing the subquery

               generators specified by the controls identified by said query form annotation.

25.   The system of claim 24, further comprising:

2 an assembler programmed to receive query parameters submitted by the user's on-

3   screen completion of one of the constructed query form web pages, execute

4   the subquery generators initialized in association with the query form web

5   page to form a machine-readable query request according to the query

6   parameters, and initiate execution of the query request upon the body of

7   data;

8 a rendering engine programmed to receive an output of query results responsive to

9   execution of the query request, and present the query results to the user.

1 26. A reconfigurable web-browser-compatible query system, comprising:

2 a data schema describing a body of data to be queried;

3 multiple appearance templates;

4 multiple controls each control comprising:

5   specification of at least one of the appearance templates and at least one

6   subquery generator;

7   mapping between the specified appearance template and the data schema

8   and between the specified subquery generator and the data schema;

9 one or more query form annotations comprising:

10   identification of one or more of controls;

11   identification of elements of the data schema to be presented in query

12   results;

13 a compiler to create web-browser-compatible representations of the query form

14   annotations;

15 a run-time engine comprising an assembler to construct queries against the data

16   schema according to query parameters submitted by user completion of the

17   web-browser-compatible representations and a rendering engine to provide

18   web-browser-compatible outputs of query results.

1   27.   The system of claim 26, where:

2   the system further comprises multiple of the subquery generators each such query

3   generator comprising machine-executable code to prepare query instructions

4   applying a prescribed logical operation to the body of data;

5   the assembler is configured to construct queries against the data schema by

6   assembling and activating the subquery generators specified by the query

7   form annotations.

1   28.   A query processing system, comprising:

2   data schema means describing entries in a body of data such that the entries

3   provide instances of the data schema;

4   multiple appearance template means each for providing instructions for computer

5   presentation of on-screen constructs to receive user input of query

6   parameters;

7   multiple subquery generator means each for preparing machine-executable query

8   instructions applying a predetermined logical operation to the body of data;

9   multiple control schema means each for prescribing constituent components of

10   query form controls providing instances of that control schema, the

11   prescribed components of each control schema comprising:

12   specification of at least one appearance template means and at least one

13   subquery generator means;

14   mapping between the specified appearance template means and the data

15   schema means and between the specified subquery generator and the

16   data schema means;

17   query form schema means for prescribing constituent components of query form

18   annotations that provide instances of the query form schema, said

19   components comprising:

20   identification of one or more of instances of the control schema means;

21   identification of elements of the data schema to be presented in query

22   results.

1   29.   A reconfigurable web-browser-compatible query system, comprising:

2   data schema means for describing a body of data to be queried;

3   multiple appearance template means;

4   multiple control means each for:

5   specifying at least one of the appearance template means and at least one

6   subquery generator means;

7   mapping between the specified appearance template and the data schema

8   means and between the specified subquery generator and the data

9   schema;

10   one or more query form annotation means for:

11   identifying one or more of control means;

12   identifying elements of the data schema means to be presented in query

13   results;

14   compiler means for creating web-browser-compatible representations of the query

15   form annotation means;

16   a run-time engine comprising an assembler means for constructing queries against

17   the data schema means according to query parameters submitted by user

18   completion of the web-browser-compatible representation and rendering

19   engine means for providing web-browser-compatible outputs of query results.

1   30.   A query processing platform, comprising:

2   multiple query form schemas and multiple query form annotations each comprising

3   an instance of one of the query form schemas;

4   a data schema;

5   appearance templates;

6   a compiler including access to the annotations and appearance templates;

7   a run-time engine including a query rendering engine and a query assembler;

8   subquery generators accessible by the assembler and the compiler.

1   31.   A query processing system, comprising:

2   a data schema describing entries in a body of data such that the entries provide

3   instances of the data schema;

4   multiple appearance templates each providing instructions for computer

5   presentation of on-screen constructs to receive user input of query

6   parameters;

7   multiple subquery generators each comprising machine-executable code to prepare

8   machine-executable query instructions applying a predetermined logical

9   operation to the body of data;

10   query form schemas prescribing constituent components of corresponding query

11   form annotations that provide instances of the query form schemas, said

12   components comprising:

13   specification of at least one appearance template and at least one subquery

14   generator;

15   mapping between the specified appearance template and the data schema

16   and between the specified subquery generator and the data schema;

17   identification of elements of the data schema to be presented in query

18   results.

32.   The system of 31, further comprising:

      one or more query form annotations, each annotation comprising an instance of the

          query form schema.

33.   The system of claim 31, further comprising a compiler programmed to perform

operations to process query form annotations, the operations comprising, for each query

form annotation:

      constructing a query form web page including the appearance templates specified

          by the query form annotation;

      in association with the constructed query form web page, initializing the subquery

          generators specified by the query form annotation.

34.   The system of claim 33, further comprising:

2   an assembler programmed to receive query parameters submitted by the user's on-

3   screen completion of one of the constructed query form web pages, execute

4   the subquery generators initialized in association with the query form web

5   page to form a machine-readable query request according to the query

6   parameters, and initiate execution of the query request upon the body of

7   data;

8   a rendering engine programmed to receive an output of query results responsive to

9   execution of the query request, and present the query results to the user.

1   35.   A reconfigurable web-browser-compatible query system, comprising:

2   a data schema describing a body of data to be queried;

3   multiple appearance templates;

4   query form annotations each comprising:

5   specification of at least one of the appearance templates and at least one

6   subquery generator;

7   mapping between the specified appearance template and the data schema

8   and between the specified subquery generator and the data schema;

9   identification of elements of the data schema to be presented in query

10   results;

11   a compiler to create web-browser-compatible representations of the query form

12   annotations;

13   a run-time engine comprising an assembler to construct queries against the data

14   schema according to query parameters submitted by user completion of the

15   web-browser-compatible representations and a rendering engine to provide

16   web-browser-compatible outputs of query results.

1   36.   The system of claim 35, where:

2   the system further comprises multiple of the subquery generators each subquery

3   generator comprising machine-executable code to prepare query instructions

4   applying a prescribed logical operation to the body of data;

5   the assembler is configured to construct queries against the data schema by

6   assembling and activating the subquery generators specified by the query

7   form annotations.

1   37.   A query processing system, comprising:

2   data schema means for describing entries in a body of data such that the entries

3   provide instances of the data schema;

4   multiple appearance template means each for providing instructions for computer

5   presentation of on-screen constructs to receive user input of query

6   parameters;

7   multiple subquery generator means each for preparing machine-executable query

8   instructions applying a predetermined logical operation to the body of data;

9   query form schema means for prescribing constituent components of corresponding

10   query form annotations that provide instances of the query form schemas,

11   said components comprising:

12   specification of at least one appearance template means and at least one

13   subquery generator means;

14   mapping between the specified appearance template means and the data

15   schema means and between the specified subquery generator and the

16   data schema means;

17   identification of elements of the data schema to be presented in query

18   results.

1   38.   A reconfigurable web-browser-compatible query system, comprising:

2   data schema means for describing a body of data to be queried;

3   multiple appearance template means;

4   query form annotation means for:

5   specifying at least one of the appearance template means and at least one

6   subquery generator means;

7   mapping between the specified appearance template means and the data

8   schema means and between the specified subquery generator and the

9   data schema means;

10   identifying elements of the data schema to be presented in query results;

11   compiler means for creating web-browser-compatible representations of the query

12   form annotations;

13   a run-time engine comprising an assembler means for constructing queries against

14   the data schema means according to query parameters submitted by user

15   completion of the web-browser-compatible representations and rendering

16   engine means for providing web-browser-compatible outputs of query results.